

EVALUATION OF p + 2H CROSS SECTIONS FOR THE ENERGY
RANGE 0.1 to 150 MeV

P. G. Young, M.B. Chadwick, and G. M. Hale
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1. SUMMARY

This evaluation provides a complete representation of the nuclear data needed for transport, damage, heating, radioactivity, and shielding applications over the incident neutron energy range from 0.1 to 150 MeV.

To summarize, the following ENDF sections are utilized at all energies:

MF=3 MT= 2 Elastic Scattering Cross Section
MT= 28 2H(p,np)1H Cross Section
MT=102 Radiative Capture Cross Section (Estimate Only at higher energies)

MF=6 MT= 2 Elastic Proton Angular Distributions
MT= 28 Production Cross Sections and Energy-Angle Distributions for Emission Neutrons and Protons
MT=102 Gamma-ray multiplicities from radiative capture and designation of residual nucleus for heating.

2. METHODOLOGY USED IN EVALUATION

Our preliminary evaluation of the 2H(p,n2p) cross section is based on experimental data for both the p + 2H [Ca73] and n + 2H reaction (nonelastic) cross sections, since these appear to be indistinguishable at energies above about 20 MeV. Additionally, we utilize the Faddeev calculations of Sloan [Sl71] for the evaluated cross section at lower energies.

We are utilizing the results of Hale's R-matrix analysis of p + 2H data at proton energies up to 4 MeV and experimental data up to an energy of 65 MeV for the evaluation of elastic scattering. The angular distribution from the 64.8-MeV measurement is used up to 150 MeV.

Experimental data [Gr55] normalized to sigma=4.15e-6 barns at a proton energy of 1 MeV are used for the 2H(p,gamma)3He cross section below 2 MeV; these results are joined smoothly to the ENDF/B-VI evaluated 2H(n,gamma)3H cross section above 4 MeV.

REFERENCES

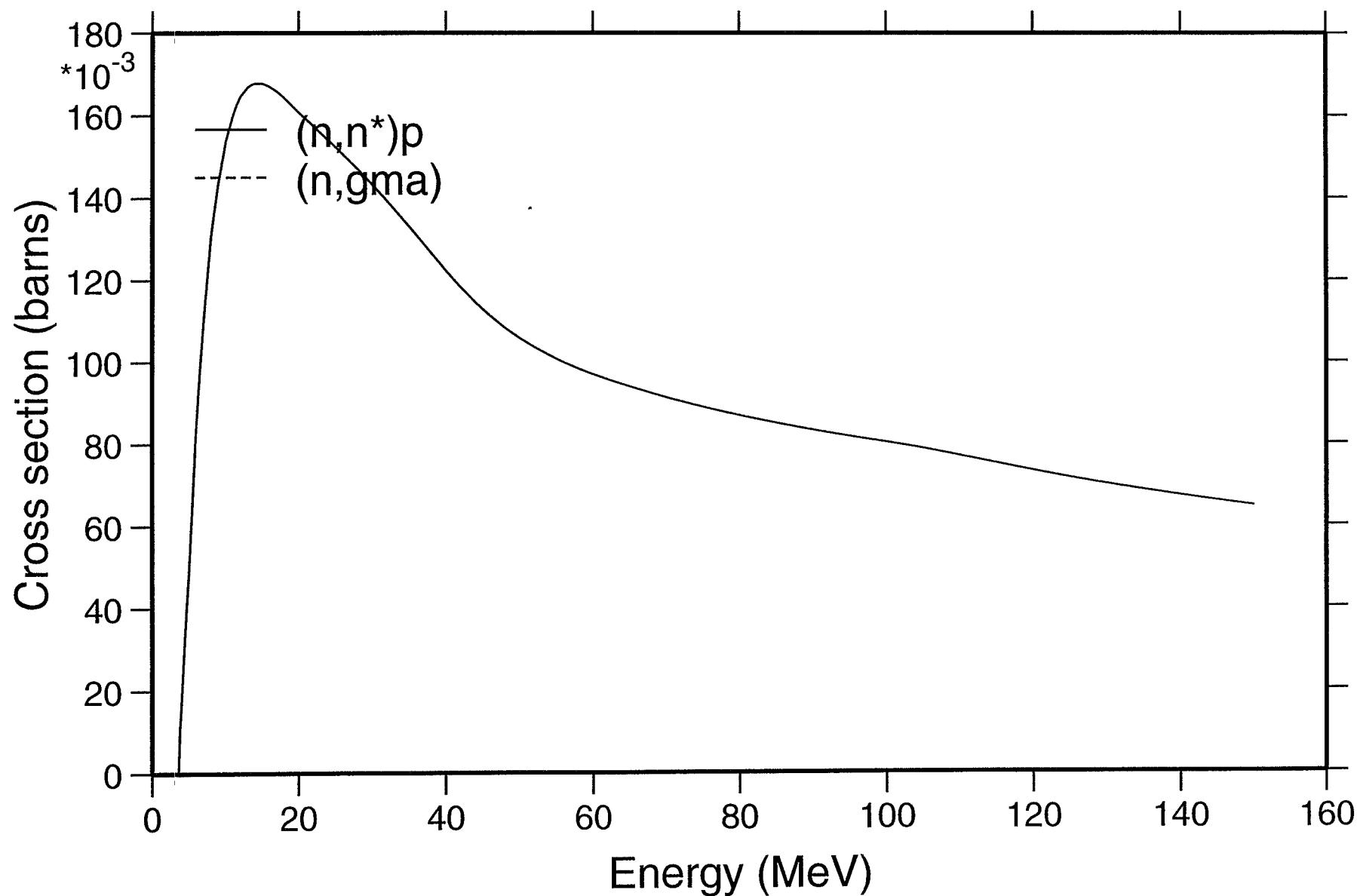
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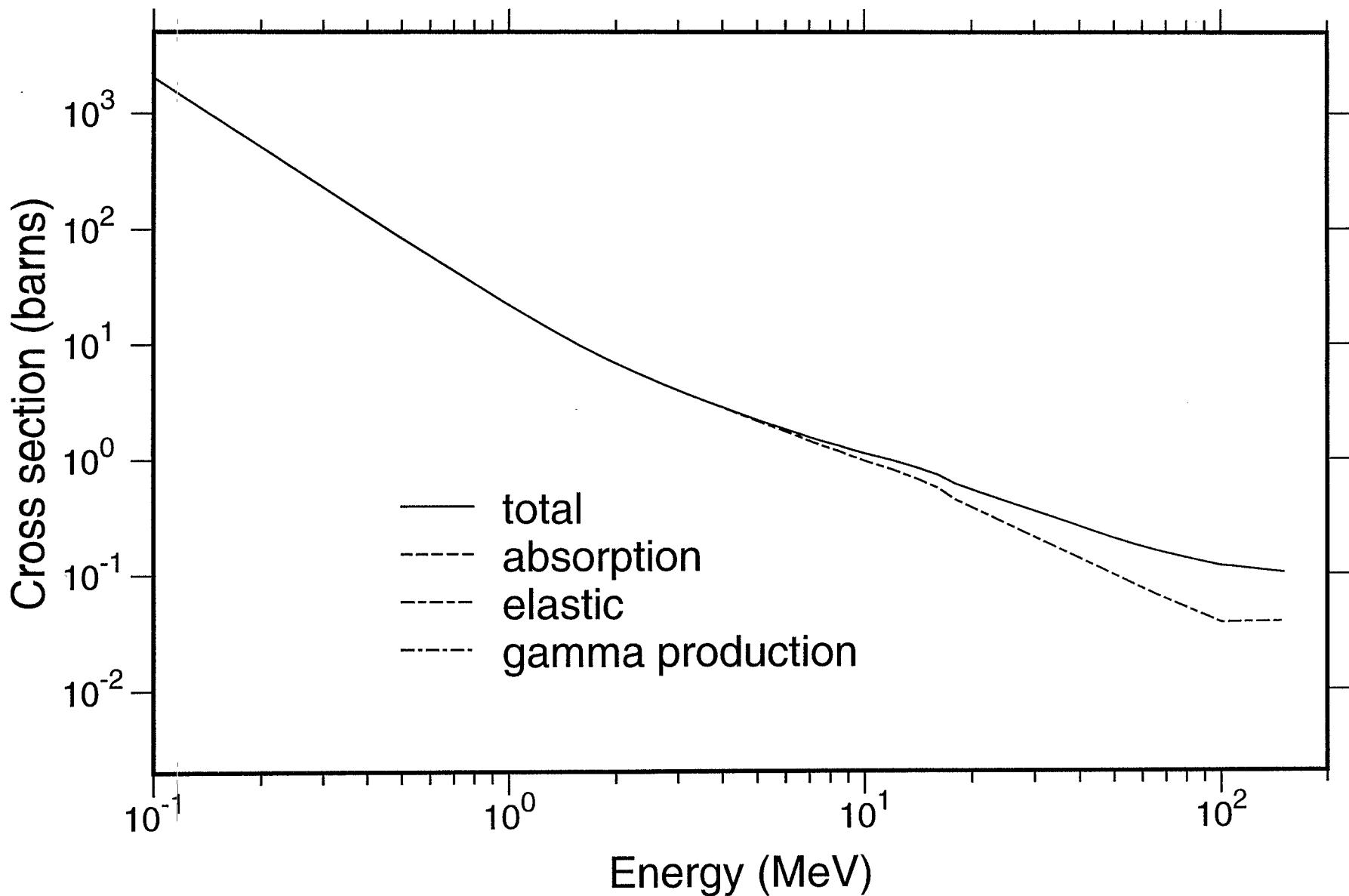
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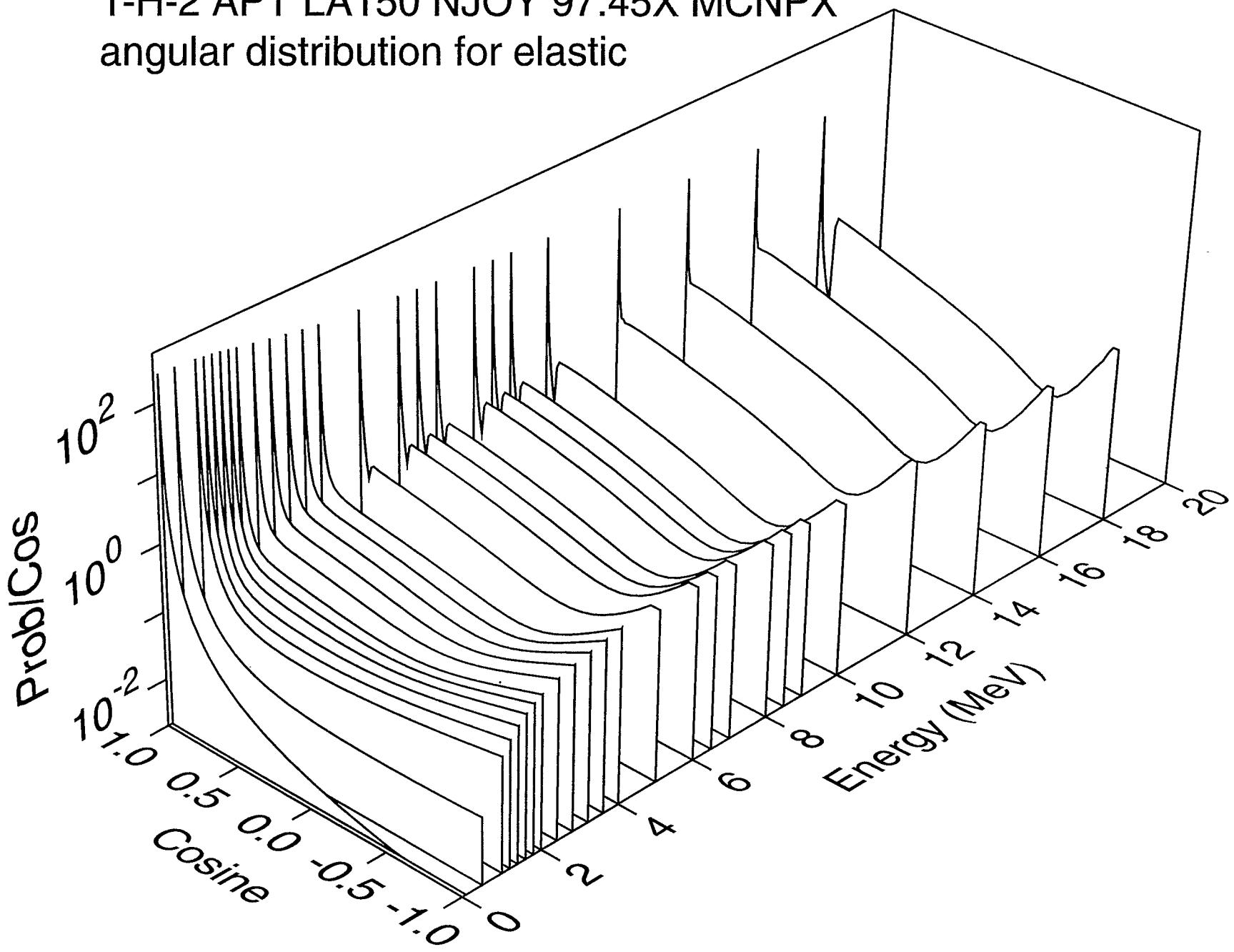
1-H-2 APT LA150 NJOY 97.45X MCNPX
Threshold reactions



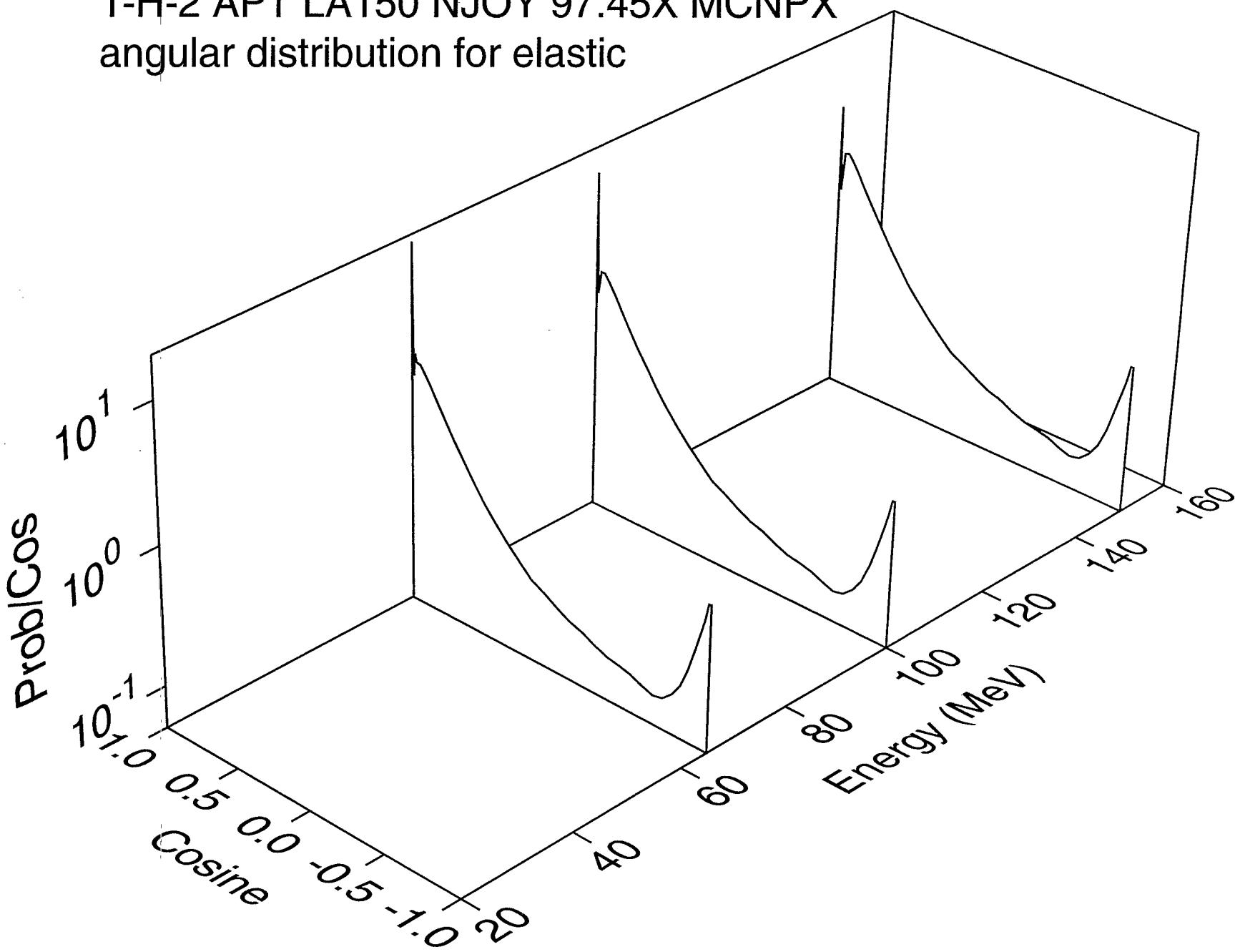
1-H-2 APT LA150 NJOY 97.45X MCNPX
Principal cross sections



1-H-2 APT LA150 NJOY 97.45X MCNPX
angular distribution for elastic



1-H-2 APT LA150 NJOY 97.45X MCNPX
angular distribution for elastic



1-H-2 APT LA150 NJOY 97.45X MCNPX

Heating

